MEMORANDUM

State of Alaska
Department of Transportation & Public Facilities
Northern Region Design & Engineering Services

TO: Sarah E. Schacher, P.E.
Preconstruction Engineer
Northern Region

DATE: October 8, 2020

FILE NO: R:\Projects\Fbks_NP\NFHWY00435_South_Fairbanks_Industrial_Roads_Resurfacing\5_PS&E\2_DSR

THRU: James Allen, P.E. JA
Project Delivery Team Lead
Northern Region

TELEPHONE NO: 907-451-5448

FAX NO: 907-451-5126

FROM: John J. Netardus, P.E. JN
Engineering Manager
Northern Region

SUBJECT: South Fairbanks Industrial Roads Resurfacing
NFHWY000435/0002455
Abbreviated Design Study Report

Introduction/History

The Alaska Department of Transportation and Public Facilities (DOT&PF), in cooperation with the Alaska Division of the Federal Highway Administration is proposing to resurface 3.08 miles of a portion of three roads under the South Fairbanks Industrial Roads project. The roads included in this project provide vital access to south Fairbanks Industrial zones, solid waste management, and wastewater treatment services. The improvement activities will correct deficiencies in the roadway surfaces that have grown over time, restore serviceability, and delay the need for extensive capital improvement projects.

Project Description

This project proposes to resurface sections of three roads in the South Fairbanks Area: Peger Road, Easy Street, and the Old Richardson Highway. Peger Road will also include replacement of guardrail and a railroad crossing that has been a continuous burden to maintain in its current condition.

Design Standards

This project will be designed in accordance with the following standards:

- *A Policy on Geometric Design of Highways and Streets, 2011.* American Association of
- State Highways and Transportation Officials (AASHTO).
- *Alaska Highway Preconstruction Manual (HPM),* State of Alaska Department of
- Transportation and Public Facilities (DOT&PF).
- *Guide for the Development of Bicycle Facilities, 2012.* AASHTO
- *Roadside Design Guide, 2011.* AASHTO.
- *MUTCD 2009.*
- *Alaska Traffic Manual (ATM).*
- *U.S. Department for Transportation ADA Standards for Transportation Facilities, 2006.*
- *U.S. Department of Justice ADA Standards for Accessible Design, 2010.*

Design Exceptions and Design Waivers

A Design Designation and Design Criteria wavier is in Appendix A.

Design Alternatives

No design alternatives were considered. Pulverizing the existing asphalt and repaving with HMA was recommended by the Alaska Flexible Pavement Design manual.

Preferred Design Alternative

Peger Road
- Pulverize existing asphalt and repave roadway. Replace Railroad crossing. Replace guardrail.

Easy St.
- Pulverize existing asphalt and repave roadway.

Old Richardson Highway
- Pulverize existing asphalt and repave roadway.

3R Analysis

A 3R analysis is not applicable.

Traffic Analysis

A traffic analysis is not required for this project.

Horizontal/Vertical Alignment

A slight vertical adjustment may be made at the Peger Road railroad crossing. Vertical adjustments up to 6 inches may be made at low spots along the roadways prone to flooding. Horizontal alignments will not be modified.

Typical Section(s)

See Appendix B.

Pavement Design

This project followed the recommended pavement design life of 5 years from the HPM Section 1140. The Alaska Flexible Pavement Design manual guidance policy recommended reusing the existing asphalt concrete material in the new structure. Using this guidance the pavement design will consist of 2” of HMA on top of 6” of crushed asphalt base course on top of the existing pavement structure.

Asphalt Roadways will have:
- 2 inches HMA, Type II, Class B
- 6 inches Crush Asphalt Base Course

See Appendix C.

Preliminary Bridge Layout

There are no bridges in this project.

Right-of-Way Requirements

All project work will remain within the existing right-of-way. No acquisitions will be required.

Maintenance Considerations

The roads within the project are maintained by the DOT&PF Maintenance and Operations. There will not be any new lanes miles or pedestrian facilities added by this project. The new surface will reduce road maintenance cost.

Material Sources

All Materials will be furnished by the contractor. There are multiple commercial material sources available in the Fairbanks area.

Utility Relocation & Coordination

Numerous existing utilities are located within the project area, this project will be designed to avoid underground and overhead utilities. Utility lids, manholes, and other appurtenances will be adjusted.

The Alaska Railroad crossing will be replaced on Peger Road which will require a utility relocation agreement. Crossing surface is being upgraded to meet current Alaska Railroad crossing standards. There is no design alternative, the concrete crossing panels are required on any upgrades. The current crossing surface results in frequent rail strikes by vehicles and requires maintenance activity for most of the rail strikes.

Access Control Features

Access control is maintained by the driveway permit approval process. No access control features will be modified.

Pedestrian/Bicycle (ADA) Provisions

Pedestrians and bicycles will continue to be accommodated on the roadway shoulders.

Safety Improvements

Safety improvements include replacing signage for visibility and safety and clearing of vegetation.

Intelligent Transportation System Features

This Project does not include Intelligent Transportation System components.

Drainage

The project area is flat with no water bodies. Existing drainage consists of roadside ditches that act as storage for rain fall and snow melt. The culverts within the project limits were determined to be in good condition. A portion of the project on Peger Rd. crosses over the Army Corps of Engineers Channel A but the ditches are not routed to the channel. There are seven 3ft diameter helical un-welded galvanized culverts crossing under Peger Rd. at the Channel A crossing. The Channel A culverts were inspected and found to have no major deflections or seam failures that would warrant replacement.

Due to the flat nature of the South Fairbanks area, spring snow melt creates large ponding water bodies next to the roadways. Ponding water is seasonal and has a limited effect on the roadway with the greatest effect located on Easy St. With limited ditches and locations to route the water, corrective action for the ponding issue on Easy St. will include grade raises and ditch reconditioning at spot locations.

Soil Conditions

The existing road embankment for Peger Rd. south of Van Horn Rd. is approximately 2” of HMA on top of 4 ft. of gravel placed on top of silt. The existing road embankment for Easy St. and the Old Richardson Hwy. is approximately 2” of HMA on top of 2 ft. of gavel placed on top of alluvial river gravel. A materials investigation will not be performed for this project, as there are no planned alterations to subsurface conditions. The roadways have not received any extensive repairs by M&O to warrant obtaining a Ground Penetrating Radar (GPR) report for the existing asphalt thickness.

Erosion and Sediment Control

Erosion and sediment control requirements will be minor for this project and a SWPP will not be required. BMPs (best management practices) used may include dust control, inlet protection and runoff control. Post construction BMPs may include, but are not limited to establishment of vegetation, and paved road surface.

Environmental Commitments

The environmental document indicates there are no environmental commitments at this time. If new environmental issues or impacts are identified during design, proper steps will be taken to address those issues. A flood plain permit is anticipated for this project. The Environmental Document signature page is provided in Appendix D.

Work Zone Traffic Control

Contract specifications will require the contractor to provide and follow a Traffic Control Plan. Traffic will be open in at least one direction at all times. Peger Road will be closed at the Railroad crossing for the duration of the installation of the new crossing. Access will be maintained around the Railroad crossing by routing traffic down Lathrop St. to Sanduri Ave. to south Peger Rd.

Value Engineering

A value engineering study will not be prepared for this project. The roads in this project are not on the National Highway System and the total estimated project cost (all phases) is less than $40 Million. This is in compliance with P&P 05.01.030 dated April 12, 2013.

Cost Estimate

The estimated costs for this project are as follows:

Design	$220,000.00
Utilities	$350,000.00
Right of Way	$0.00
Construction (Includes 20% Engineering)	$2,718,057.54
Total Cost of Project	$3,288,057.54

Approved: _____ 10/12/2020
Sarah E. Schacher, P.E., Preconstruction Engineer Date

ncb/ms

Attachments:

Appendix A: Design Designation and Design Criteria Waiver
Appendix B: Typical Sections
Appendix C: Pavement Design
Appendix D: Environmental Document Signature Page

Copy to: Preconstruction/Project file

cc: NR Design Directive 20-01 Distribution

APPENDIX A

DESIGN DESIGNATION AND DESIGN CRITERIA WAIVER

MEMORANDUM

State of Alaska
Department of Transportation & Public Facilities
Northern Region Design and Engineering Services

TO: Sarah E. Schacher, P.E.
Preconstruction Engineer
Northern Region

THRU: James Allen, P.E.
Project Delivery Lead
Northern Region

FROM: John J. Netardus, P.E.
Engineering Manager
Northern Region

DATE: August 28, 2020

FILE NO: R:\Projects\Fbks_NP\NFHW:Y00435_South_Fairbnks_Industrial_Roads_Rsurfacing\5_PS&E\1_Design_Criteria

PHONE NO: 907-451-5448

FAX NO: 907-451-5126

SUBJECT: South Fairbanks Industrial Roads
NFHWY00435/0002455
Design Designation and Design Criteria Waiver

A waiver of the Highway Preconstruction Manual requirement for a Design Criteria (HPM 1100.4.2) is requested.

The purpose of this project is to recondition approximately 43,957 square yards of asphalt pavement within the Fairbanks North Star Borough and the City of Fairbanks. The resurfacing will occur on sections of Peger Road, Easy Street, and the Old Richardson Highway. All work will take place on the existing road and road embankment. The resurfacing section on Peger Road will also include guardrail replacement and replacement of a Rail Road crossing.

Please acknowledge your approval of the waiver of Design Criteria by signing below:

Approved: _____ 10/12/2020
Sarah E. Schacher, P.E., Preconstruction Engineer — Date

ncb/ms

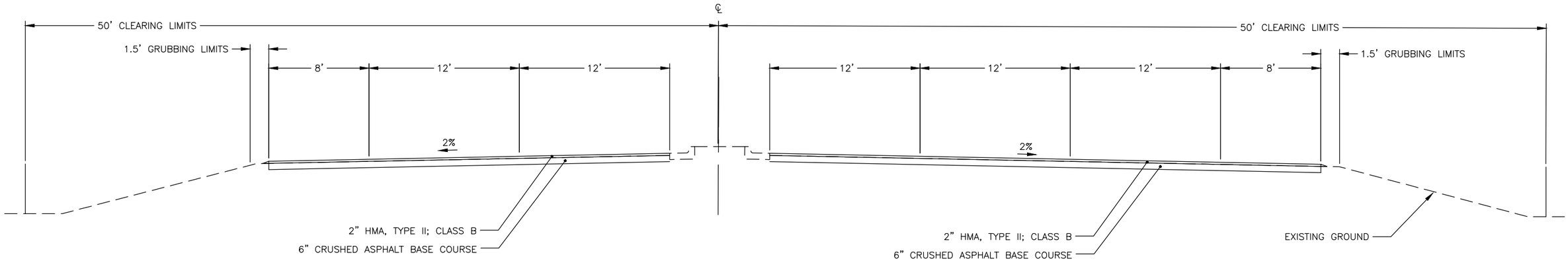
cc: Schott Vockeroth, NR Planning

APPENDIX B

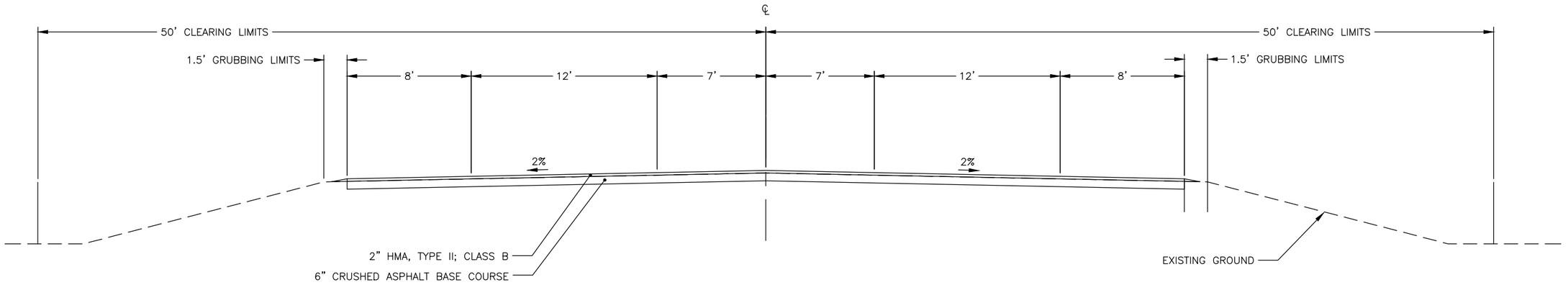
TYPICAL SECTIONS

NO.	DATE	REVISION

STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	NFHWY00435	2021	B1	B4



OLD RICHARDSON TYPICAL SECTION 1



OLD RICHARDSON TYPICAL SECTION 2

NOTES:

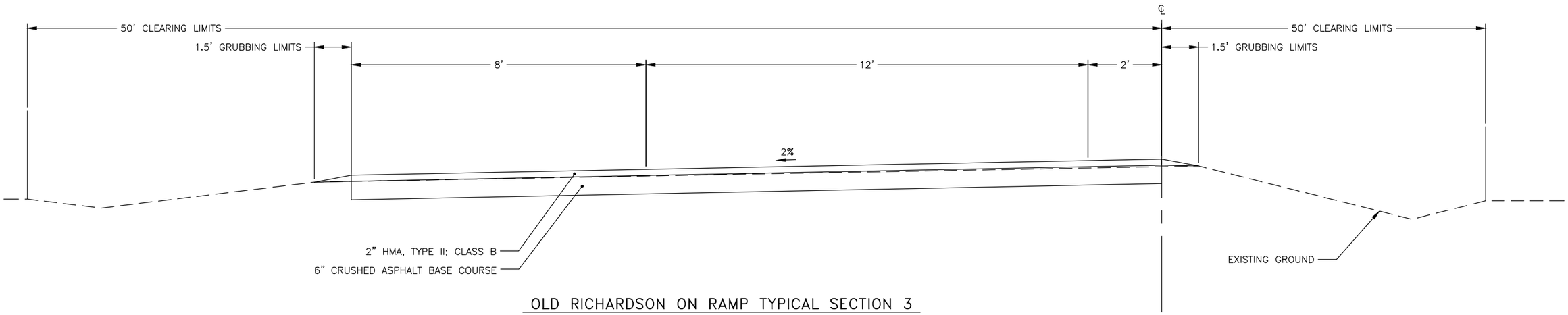
1. ROAD CROSS SLOPES VARY DUE TO SUPPER ELEVATION.

TYPICAL SECTION

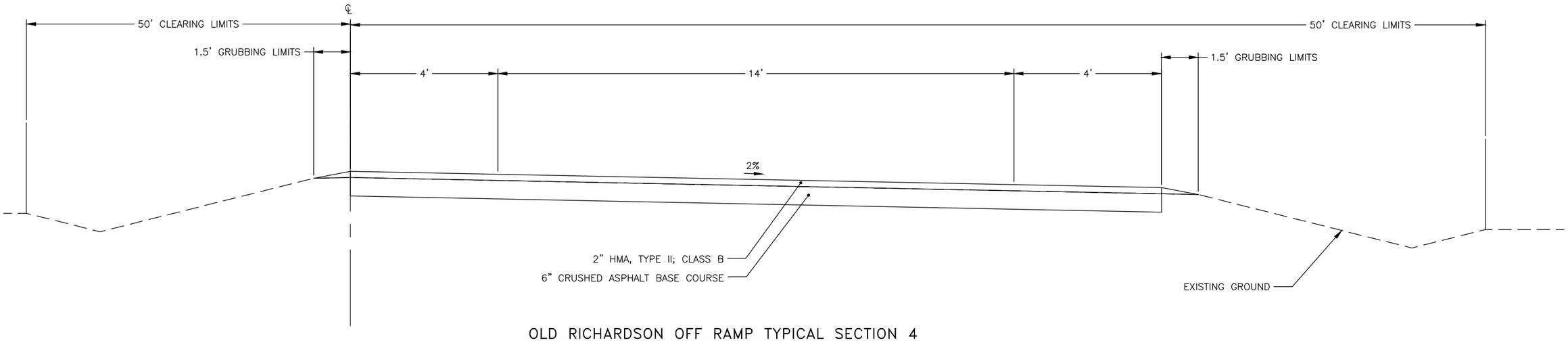
STATE OF ALASKA
49 TH
JOHN JARO NETARDUS
CE 124494
REGISTERED PROFESSIONAL ENGINEER

NO.	DATE	REVISION

STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	NFHWY00435	2021	B2	B4



OLD RICHARDSON ON RAMP TYPICAL SECTION 3



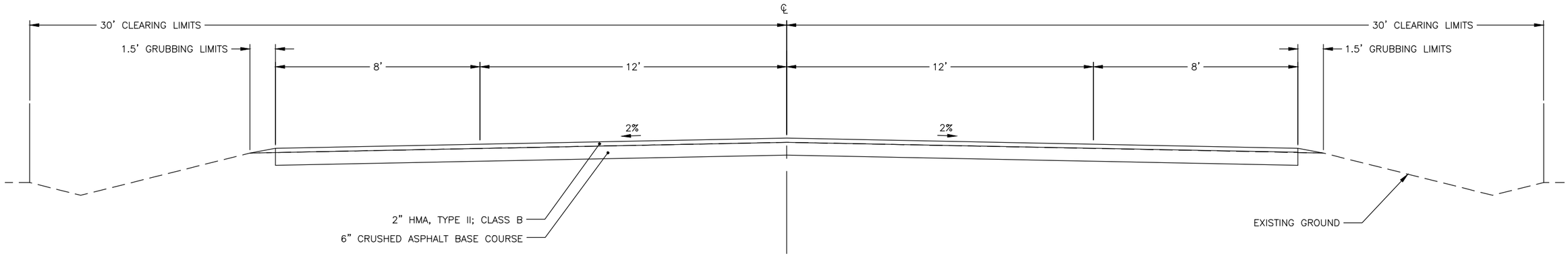
OLD RICHARDSON OFF RAMP TYPICAL SECTION 4

TYPICAL SECTION

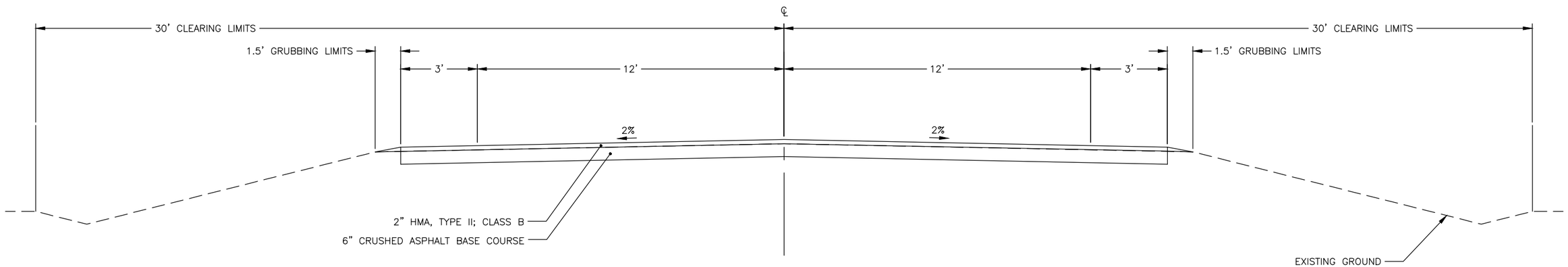
STATE OF ALASKA
49 TH
JOHN JARO NETARDUS
CE 124494
REGISTERED PROFESSIONAL ENGINEER

NO.	DATE	REVISION

STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	NFHWY00435	2021	B3	B4



EASY ST. TYPICAL SECTION 1



EASY ST. TYPICAL SECTION 2

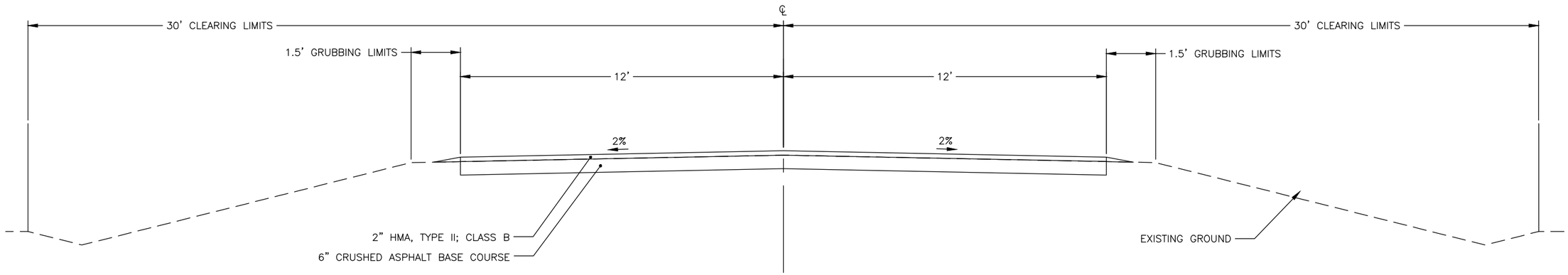
TYPICAL SECTION

STATE OF ALASKA
49 TH
JOHN JARO NETARDUS
CE 12494
REGISTERED PROFESSIONAL ENGINEER

PLANS DEVELOPED BY: STATE OF ALASKA DEPARTMENT OF TRANSPORTATION & PUBLIC FACILITIES, NORTHERN REGION, 2301 PEGER ROAD, FAIRBANKS, AK 99709 (907)451-2200
R:\Projects\Fbks_NP\NFHWY00435 South Fairbanks Industrial Roads Resurfacing\7 Drafting\PS&E drawings\B1-TYPICAL B3 Tue, Sep/22/20 04:19pm

NO.	DATE	REVISION

STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	NFHWY00435	2021	B4	B4



PEGER ROAD TYPICAL SECTION 1

PLANS DEVELOPED BY: STATE OF ALASKA DEPARTMENT OF TRANSPORTATION & PUBLIC FACILITIES, NORTHERN REGION, 2301 PEGER ROAD, FAIRBANKS, AK 99709 (907)451-2200
R:\Projects\Fbks_NP\NFHWY00435 South Fairbanks Industrial Roads Resurfacing\7 Drafting\PS&E drawings\B1-TYPICAL B4 Tue, Sep/22/20 04:19pm

TYPICAL SECTION

STATE OF ALASKA
49 TH
JOHN JARO NETARDUS
CE 12449
REGISTERED PROFESSIONAL ENGINEER

APPENDIX C

PAVEMENT DESIGN

Project Name:	South Fairbanks Industrial Roads
Project Number:	NFHWY00435
Designer:	Nick Brehm
Date:	8/21/2020
Mechanistic Design Type:	New Design
File Path:	R:\Projects\Fbks_NP\NFHWY00435 South Fairbanks Industrial Roads Resurfacing\5 PS&E\2 DSR\Pavement Design\00435 FPD.xml

Traffic Data for Design and Historic ESALs

Design Data Input	
Design Construction Year:	2021
Design Length in Years:	5
Base Year:	2020
Base Year Total AADT:	5,227
Growth Rate % per Year:	1

Historic Data Input	
Historic Construction Year:	
Backcast % per Year:	

% of Base Year AADT for Each Lane	
Lane	%
1	50
2	50
3	0
4	0
5	0
6	0

% of Base Year AADT for Each Lane	
Lane	%
1	
2	
3	
4	
5	
6	

Truck Category	Load Factor	% AADT
2-Axle (Class 5)	0.50	6.11
3-Axle (Class 6,8)	0.85	2.45
4-Axle (Class 7,8)	1.20	0.71
5-Axle (Class 9,11)	1.55	0.43
>=6-Axle (Class 10,12,13)	2.24	0.54

Truck Category	Load Factor	% AADT
2-Axle (Class 5)	0.50	
3-Axle (Class 6,8)	0.85	
4-Axle (Class 7,8)	1.20	
5-Axle (Class 9,11)	1.55	
>=6-Axle (Class 10,12,13)	2.24	

Design Lane AADT:	2,640
Computed Design ESALs:	386,620

Historical Lane AADT:	
Computed Historical ESALs:	

Construction Year ESAL Calculations			
Truck Category	% AADT	Load Factor for Truck Category	ESALs
2-Axle (Class 5)	6.11	0.5	29,438
3-Axle (Class 6,8)	2.45	0.85	20,067
4-Axle (Class 7,8)	0.71	1.2	8,210
5-Axle (Class 9,11)	0.43	1.55	6,422
>=6-Axle (Class 10,12,13)	0.54	2.24	11,656
	Total Construction Year ESALs:		75,793

Historical Construction Year ESAL Calculations			
Truck Category	% AADT	Load Factor for Truck Category	ESALs
	Total Historic Year ESALs:		

Project Name: South Fairbanks Industrial Roads			Project Number: NFHWY00435				Analysis Date: 8/27/2020		Project Status			
Design Type: New Design			Designer: Nick Brehm				Unit: US Customary		All layer damages less than 100%.			
Project Location: FAIRBANKS INTL AP			Tire Load (lbs) 4500	Load Description:			ESAL					
				Load Loc (in)								
		Design	Tire Press. (psi)	X:	0	13.5						
Design AADT: 5,227		Loadings	110	Y:	0	0						
Spring%: 10		38,662		Eval Loc (in)								
Summer%: 25		96,655		X:	0	6.75						
Fall%: 25		96,655		Y:	0	0						
Winter%: 40		154,648										
Total%: 100		386,620										
Layer	Critical Z Coordinate (in)	Asphalt Properties	Season	Modulus (Ksi)	Poisson's Ratio	Tensile Micro Strain	Compressive Stress (psi)	Million Cycles to Failure	Past Damage (%)	Future Damage (%)	Total Damage (%)	
		Air%: 5	Spring	450	0.30	209		2.14		1.80	1.80	
Thickness (in): 2	1.99	Asphalt%: 5.5	Summer	400	0.30	184		3.61		2.68	2.68	
Name: Asphalt Concrete (Modified Asph.)		Density (pcf) 148	Fall	400	0.30	184		3.61		2.68	2.68	
Use TAI: Yes			Winter	1200	0.30	129		4.56		3.40	3.40	
								Total Damage:		10.56	10.56	
		Air%:	Spring	80	0.35		73.9	0.51		7.56	7.56	
Thickness (in): 6	2.01	Asphalt%:	Summer	90	0.35		78.6	0.61		15.75	15.75	
Name: Crushed Asph. Base Course		Density:	Fall	90	0.35		78.6	0.61		15.75	15.75	
Use TAI:			Winter	120	0.35		63.9	3.09		5.01	5.01	
								Total Damage:		44.07	44.07	
		Air%:	Spring	20	0.40		14.7	1.00		3.87	3.87	
Thickness (in): 36	8.01	Asphalt%:	Summer	30	0.40		17.1	2.48		3.89	3.89	
Name: Select A P200<10%		Density:	Fall	30	0.40		17.1	2.48		3.89	3.89	
Use TAI:			Winter	50	0.40		16.6	14.46		1.07	1.07	
								Total Damage:		12.72	12.72	
		Air%:	Spring	35	0.40		2.0	4330.89		0.00	0.00	
Thickness (in): 0	44.01	Asphalt%:	Summer	40	0.40		2.0	7167.13		0.00	0.00	
Name: Subbase F P200<6%		Density:	Fall	40	0.40		2.0	7167.13		0.00	0.00	
Use TAI:			Winter	90	0.40		2.1	83009.50		0.00	0.00	
								Total Damage:		0.00	0.00	
			Spring									
Thickness (in):			Summer									
Name:			Fall									
			Winter									
								Total Damage:				

R:\Projects\Fbks_NP\NFHWY00435 South Fairbanks Industrial Roads Resurfacing\5 PS&E\2 DSR\Pavement Design\00435 FPD.xml

Approved-Jeff Currey, P.E. NR Mat'ls Engr
8-27-20

APPENDIX D

ENVIRONMENTAL DOCUMENT

VI. Environmental Documentation Approval

	N/A	YES	NO
2. The project meets the criteria of one of the following DOT&PF Programmatic Approvals authorized in the Nov. 13, 2017 "Chief Engineer Directive – Programmatic Categorical Exclusions".		☒	☐

- *If yes, select the appropriate Programmatic Approval below, and the CE documentation form may be approved by the Regional Environmental Manager.*
- *If no, the CE documentation form must be approved by a NEPA Program Manager.*

a. Programmatic Approval 1 ☐

b. Programmatic Approval 2 ☒

c. Programmatic Approval 3 ☐

VII. Environmental Documentation Approval Signatures

Prepared by: Thomas Benjamin Date: 7/16/2020

[Signature] Environmental Impact Analyst

Thomas Benjamin

[Print Name] Environmental Impact Analyst

Reviewed by: John Netardus Date: 7/16/20

[Signature] Engineering Manager

John Netardus

[Print Name] Engineering Manager

Programmatic CE

Approved by: Brett Nelson Digitally signed by Brett Nelson DN: cn=Brett Nelson, o=DOT&PF, ou=Northern Region, email=brett.nelson@alaska.gov, c=US Date: 2020.07.16 10:55:09 -08'00' Date: 7/16/2020

[Signature] Regional Environmental Manager

Brett Nelson

[Print Name] Regional Environmental Manager

Non-Programmatic CE

Approval Recommended by: _____ Date: _____

[Signature] Regional Environmental Manager

VII. Environmental Documentation Approval Signatures

[Print Name] Regional Environmental Manager

Approved by: _____ Date: _____

[Signature] NEPA Program Manager

[Print Name] NEPA Program Manager